NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF INDUSTRIAL AND MANUFACTURING ENGINEERING

BACHELOR OF ENGINEERING (HONS) DEGREE INDUSTRIAL AND MANUFACTURING ENGINEERING

COMPUTER APPLICATIONS

TIE 2109

Supplementary ExaminationPaper
August 2015

This examination paper consists of 4 pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements:

Examiner's Name: Engineer Lungile Nyanga

<u>**INSTRUCTIONS**</u>

1. Answer any five (5) questions
2. Each question carries 20 marks
3. Use of calculators is permissible

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TIE 2109

Question 1

(a) Define the following terms commonly used in database systems. [4]
  - (i) Data ,
  - (ii) Object,
  - (iii) Attribute,
  - (iv) Primary Key.

(b) Compare and contrast the three data models (ER, UML and EXPRESS) which are commonly used in database modeling for engineering applications. [9]

(c) Use the Unified Modeling Language (UML) concept to illustrate the following types of aggregation based on product structures of your own choice.
  - (i) Composition, [3]
  - (ii) Recursive Aggregation. [4]

Question 2

(a) What is a database? In your explanation give a simple form of a database. [3]

(b) There are four basicAccess objects .Name them and give a brief description of each. [8]

(c) The most important part of creating a relational database is planning. What three aspects would you consider when creating a database and why? [9]

Question 3

(a) Programming is error-prone. Errors that occur in programming are called **bugs** and the process of tracking them down is called **debugging**. Identify three kinds of errors that can occur in a program. [3]

(b) Explain what the following two statements mean in C++; [2]

```
(i)    #include <iostream>
(ii)   using namespace std;
```

(c) Results for a program that prompts the user for the current year, the user's current age, and another year are presented in Figure Q3 below. Write a program in C++ that will give you the results. [15]

```
Enter current year then press RETURN.
1996
Enter your current age in years.
36
Enter the year for which you wish to know your age.
2001
Your age in 2001: 41
```

Figure Q3: Results for a C++ program

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TIE 2109

Question 4

(a) Define the term normalization. [1]
(b) Briefly explain the role of functional dependencies in the normalization process. [4]
(c) Define each of the following relationships with the aid of well labeled diagrams. [6]

(i)   Ternary
(ii)   Recursive

(d) Write syntax to illustrate how each of the following statements are used: [9]
(i)   Selecting all columns
(ii)   Retrieving specific rows from a table using the SELECT statement and WHERE clause.
(iii)   Sorting by a single column in descending order.

Question 5

(a) Write a program in VB to store university first team football members. The program should be able to access the names of all the players according to their shirt numbers when a particular shirt number is entered into the query textbox. Show how the name of the goalkeeper can be retrieved. Draw the interface for this program. [15]

(b) Convert each of the following mathematical formulas to C++ expressions:

(i) $b^2 - 4ac$ [1]
(ii) $x(y + z)$ [1]
(iii) $\dfrac{1}{x^2 + x + 3}$ [3]

Question 6

(a) What are the advantages of extracting block and attribute information from AutoCAD drawings. [6]

(b) Externally referencing a drawing is a powerful alternative to inserting it as a block. Explain the major advantages of using external references. [6]

(c) Explain the usage of the following block manipulation commands shown in Table Q6 below. [8]

Table Q6

Command	Usage
DBLIST	
EXPLODE	
MINSERT	
WBLOCK	

TIE 2109

Question 7

Figure Q7 below shows the table structure of a corporate database. Identify the labeled features with their correct terminology as used in databases. [7]
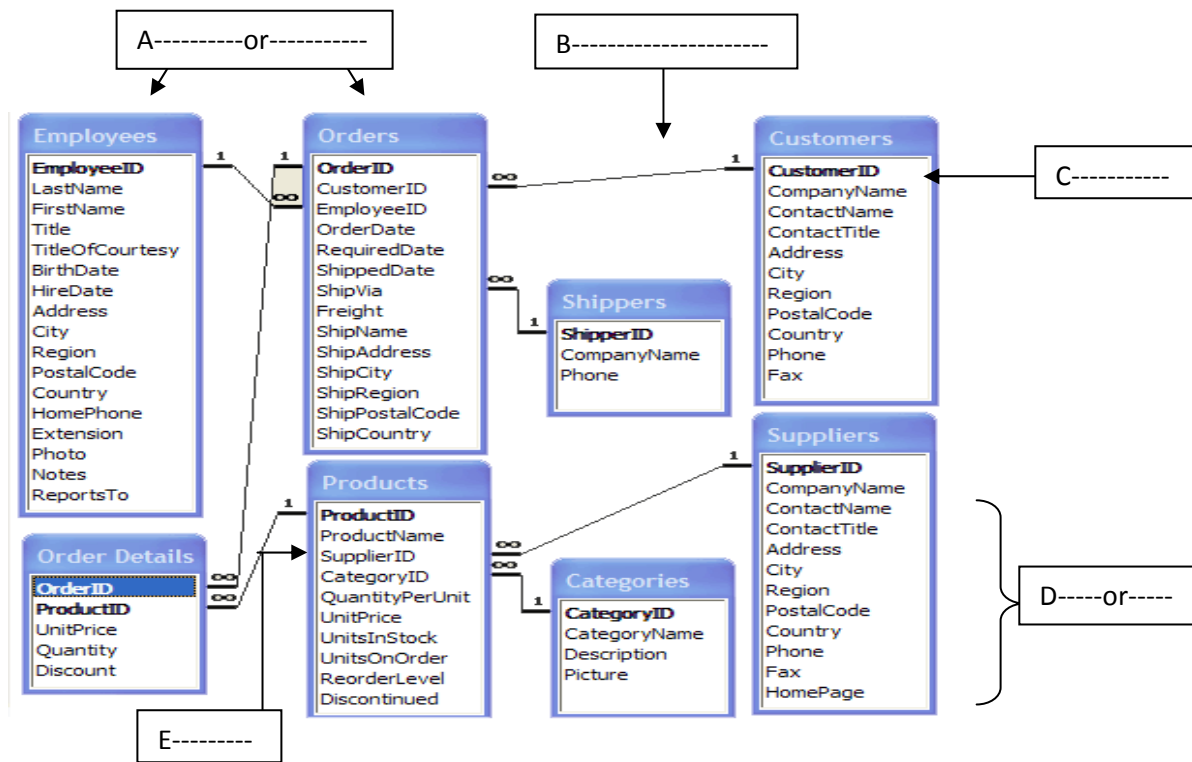

Figure Q7: Table Structure for corporate database

(a) Write SQL code which will return the first and last name of all the employees. [2]

(b) It is required for purposes of efficient data presentation to order the sample results above in ascending order, first by the FirstName followed by LastName. Write an SQL statement to achieve the ordering objective. [3]

(c) The sales executive has requested for a report showing the first and last name of all employees with title "Sales Representative" and whose title of courtesy is "Mr". You are required to write an SQL statement to filter the results according to the specified criteria. [4]

(d) Table Q7 below shows word operators used in the WHERE clause. Give a brief description of the applications of each word operator. [4]

Table Q7: SQL Word Operators

SQL Word Operators	
Operator	**Description**
BETWEEN	---
IN	---
LIKE	---
NOT	---

TIE 2109